990,889

PATENT SPECIFICATION

DRAWINGS ATTACHED

990,889

Date of Application and filing Complete Specification Oct. 15, 1962.

No. 38967/62.

Application made in Canada (No. 843,41:) on March 1, 19:2.

Complete Specification Published May 5, 1965.

Index at acceptance: —B5 A(2A4B, 2A4X); F4 U12

Int. Cl.:—B 29 d

COMPLETE SPECIFICATION

Improved Warming Device for Comminuted Materials

I, DAVID BLOOM, a citizen of Canada, of 23 Castleview Avenue, Toronto, Province of Ontario, Canada, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a warming device for providing a constant supply of comminuted materials which have been pre-warmed to a pre-determined temperature and for a pre-determined length of time.

Warming mechanism of this type is frequently utilized in the art of plastics molding, particularly molding foam plastics articles, wherein plastics material in pellet form is warmed as aforesaid for expanding the pellets to a preferred size prior to the actual molding operation; no contoural or dimensional limitations being intended by the term "pellet" as used herein.

In essence, the mechanism comprises a heating chamber with spaced inlet and outlet means and with means for moving the pellets from the inlet to the outlet means,—preferably at a constant rate so as to control the quantum of heat absorbed by the pellets during their movement aforesaid; fresh material being constantly added through the inlet means.

For various reasons which it is not deemed necessary to enumerate herein it is of some importance at times that the pellets be expanded to a relatively uniform size and it is therefore of corresponding importance that they all receive substantially the same quantum of thermal exposure. Additionally, it is also deemed to be of some importance that the pellets be kept in a state of constant turbulence to prevent agglomeration, for example.

In accordance with the invention there is provided a warming device for comminuted thermally expandable materials comprising, a generally cylindrical and upright heating chamber, material inlet facilities provided near the bottom of said chamber, a turbulator for moving said materials in orbit in said chamber and outlet facilities disposed above said inlet facilities and movable towards and away therefrom, said outlet facilities being oriented to provide escape of said materials from said orbit in a stream substantially tangential to said orbit.

A specific embodiment of the invention will now be described by way of example with reference to the accompanying drawing wherein like reference devices refer to like parts of the invention and wherein:

Figure 1 is a horizontal section of the pre-expander taken along the line 1—1 of Figure 2,

Figure 2 is an elevation of the pre-expander seen from the side which is at the bottom of Figure 1, and,

Figure 3 is an elevation of the expander seen from the right side of Figure 1.

Referring now to the drawings, the pre-expanding device is constituted by a chamber 10 in which the pellets are heated and expanded while, at the same time, being moved therein in an orbit for reasons which will become apparent. In order to suitably accommodate the said orbit the chamber 10 should be in the general shape of a cylinder mounted in an upright position as shown in the drawing.

The chamber may be supported on a base 2 of any suitable construction. The chamber 10 is provided with heating means not shown which may be of any suitable nature such as for example a current of steam introduced into the chamber 10 as hereinafter described.

The plastics pellets to be heated may be introduced into the chamber 10 through a relatively restricted inlet duct 14 which opens into the chamber 10 at the bottom of the

[P]

cylindrical wall of the chamber. The inlet duct 14 is preferably disposed in a substantially tangential direction with respect to the chamber so as to launch the pellets in their orbital movement forthwith upon their entry into the chamber 10.

The orbital movement of the pellets which may result from the tangential orientation of the duct 14 is continued—or initiated as the case may be, by turbulating means of any suitable nature such as the present exemplary device comprised of a plurality of rotating blades 16 extending diametrically of the heating chamber 10 and mounted on a common shaft 15 which may be rotated by any suitable means (not shown).

The blades 16 are spaced from each other and alternate with fixed diametrically disposed blades 18 which serve to break up any agglomeration of pellets by providing a striking surface for the pellets.

The pellets are preferably introduced into the chamber 10 by entrainment in a gaseous current, which may be constituted by the steam used as a heating medium as aforesaid.

As the pellets are introduced into the chamber 10 through the duct 14 they begin to swell and become more buoyant. As they become more buoyant, they are carried gradually upwardly in the turbulance produced by blades 16 while being swirled in orbit around the chamber 10. The pellets are thus caused to rise progressively and continuously in the chamber 10 until they reach the level of the chamber at which they find an outlet.

The pellets then exit through the outlet partly under the centrifugal force of their orbital movement and partly, upon being struck by the rotating blades 16 at the outlet level.

It will be obvious that the total heat to which the pellets are exposed—*i.e.* their "thermal exposure"—and, hence, their expansion will depend essentially upon two factors, namely: the interior temperature of the heating chamber and the travel time between the inlet and the outlet of the heating chamber 10. Assuming a constant temperature and rate of speed, the thermal exposure of the pellets can be, and is in practice, varied by varying the distance between the inlet and outlet of heating chamber 10 to increase or decrease the length of time that the pellets take in travelling from one to the other.

In practice the expansion of the pellets may need to be adjusted from time to time for different applications. Thus, in reliance upon a constant heat source for the chamber 10, such expansion is best controlled by the time spent by the pellets in the chamber and consequently by the level at which the pellets are removed from the chamber. The outlet for the pellets herein is therefore rendered adjustable in level with respect to the inlet, thus increasing or decreasing the time that the pellets spend in the chamber 10, their thermal exposure and, accordingly, their expansion.

The structure in accordance with the present embodiment of the invention which fulfills the above requirements is constituted by an elongated opening 20 in the wall of chamber 10, which opening is closed off by a closure 22 provided with an intermediate outlet chute 24 for the expanded pellets.

The opening is angularly displaced from the inlet 14 and extends along the wall of chamber 10 and is spaced a short distance from the top and bottom of chamber 10.

The closure 22 is curved to the same curvature as the cylindrical wall of chamber 10 and is slidably mounted in a pair of rails 26 disposed along the vertical sides of the opening 20. The closure 22 should be of sufficient length to close off the opening 20 in all positions in which the chute 24 communicates with the interior of chamber 10 through opening 20.

In accordance with the invention the removal of pellets from the chamber 10 is effected in a stream directed along the natural escape path of the pellets, namely, substantially tangential to the orbit of pellets in chamber 10, which presents the least obstruction thereto and so prevents pellets from accumulating in the outlet chute; which accumulation may hamper free escape of the pellets and introduce variations in their thermal exposure. For this reason the chute 24 is disposed with its axis substantially tangential to the orbit in which the pellets move in chamber 10. More specifically the chute 24 has a wall 28 tangential to the cylindrical wall of chamber 10 at its point of contact therewith and a wall 30 preferably substantially parallel to said wall 28. This disposition of the chute 24 enables the pellets to fly off the orbit through the chute 24 without striking the chute walls at substantial angles, so that the pellets do not accumulate in the chute.

The top and bottom walls 32—32 of the chute 24 are preferably slightly inclined downwardly to compensate for the gravitational trajectory of the pellets.

The adjustment of the chute level is effected by any suitable means, such as, for example, a rack 34 secured to chute 24 and to the closure 22 and operated through the agency of a pinion 36 by a handwheel 38.

It will be understood that the invention is not necessarily limited to the pre-expansion of pellets used in molding foam plastics articles but is applicable to the warming of other comminuted materials which give rise to similar problems.

WHAT I CLAIM IS:—

1. A warming device for comminuted thermally expandable materials comprising, a generally cylindrical and upright heating

chamber, material inlet facilities provided near the bottom of said chamber, a turbulator for moving said materials in orbit in said chamber and outlet facilities disposed above said inlet facilities and movable towards and away therefrom, said outlet facilities being oriented to provide escape of said materials from said orbit in a stream substantially tangential to said orbit.

2. A warming device as claimed in claim 1 wherein the heating chamber is provided with an elongated outlet opening extending between the top and bottom thereof and said outlet facilities comprise an outlet duct movable along said outlet opening in communication with said chamber, said outlet duct being substantially tangential to said chamber and means carried by said duct and movable therewith for closing said opening above and below said outlet duct.

3. A warming device as claimed in claim 2 wherein said closure means are dimensioned to cover said opening irrespective of the position of said duct.

4. A warming device as claimed in claim 2 or claim 3 wherein said outlet duct has a wall substantially tangential to the wall of said chamber and an inner wall substantially parallel to said outer wall.

5. A warming device as claimed in any of claims 2 to 4 wherein said duct is slightly downwardly inclined.

6. A warming device for thermally expandable comminuted materials substantially as described herein with reference to and as illustrated in the accompanying drawing.

DAVID BLOOM,
Per: Boult, Wade & Tennant,
111/112 Hatton Garden, London, E.C.1,
Chartered Patent Agents.

Leamington Spa: Printed for Her Majesty's Stationery Office by the Courier Press.—1965.
Published at The Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies may be obtained.

990,889 COMPLETE SPECIFICATION
1 SHEET

This drawing is a reproduction of the Original on a reduced scale.

FIG.1.

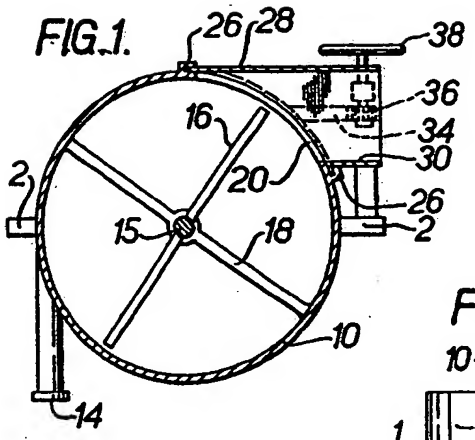

FIG.2.

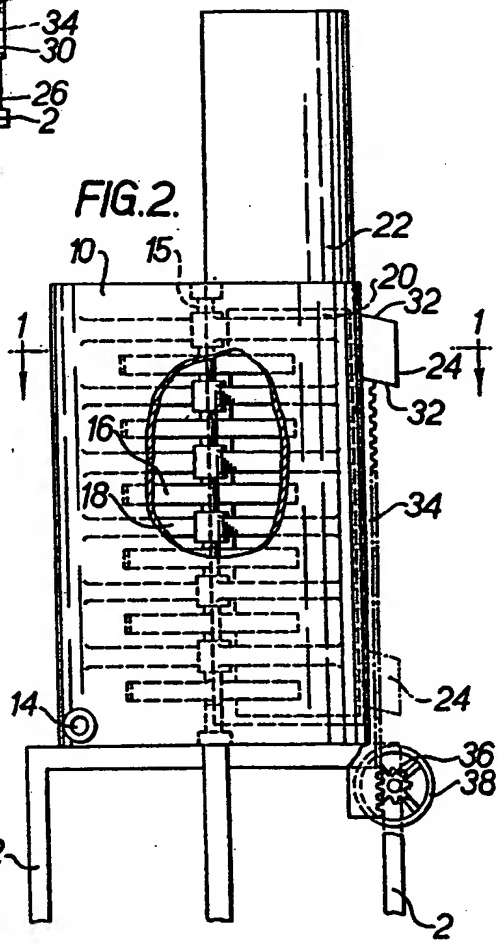

FIG.3.